

Work Order ID 48606

June 26, 2009 10:54:57 AM



Page 1

Item ID: D350-748-241TRN

Accept



Setup Start



Revision ID: D

Stop



Item Name: Crosstube Turning Detail

Start Date: 15/07/2009 Start Qty: 1.00



Cust Item ID:

Required Date: 03/08/2009 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: *MF*

Date: *09-0-09* Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	----------------	--------------	--------------	---------------	---------------	------------------	----------------

Draw Nbr Revision Nbr

D350-748-241 Rev D

100

0.00



MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs on both ends as per Folio FA647□12-Turn first side as per Folio FA647□13- File transition lines smooth.

am 09-06-170

110

0.00



QC1- Inspect dimensions to dimension sheet

QC

Memo

0.00

Quality Control

am 09-06-170

120

0.00



MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Turn second side as per Folio FA647□12- File transition lines smooth.□13- Scribe part # as per Dwg D350-748-241

am 09-06-170

June 26, 2009 10:54:57 AM

Item ID: D350-748-241TRN

Accept

Revision ID: D

Setup Start

Item Name: Crosstube Turning Detail

Stop

Start Date: 15/07/2009 **Start Qty:** 1.00

Cust Item ID:

Required Date: 03/08/2009 **Req'd Qty:** 1.00

Customer:

Reference:

Run Start

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____

Stop

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/
Work Center ID

Operation Description

Set Up/ Run Hours

**Draw
Number**

Draw
Rev.

**Plan
Code**

Accept Qty

Reject
QtyReject
Number

Insp. Stamp

130

QC1- Inspect dimensions to dimension sheet

0.00

QC

Memo

0.00

Quality Control

140

QC8- Inspect parts - second check

0.00

QC

Memo

0.00

Quality Control

150

Large Fab

0.00

Large Fab

Memo

0.00

Large Fab

Work Order ID 48606

June 26, 2009 10:54:57 AM

Page 3

Item ID: D350-748-241TRN

Accept

Revision ID: D

Item Name: Crosstube Turning Detail

Setup Start

Stop

Start Date: 15/07/2009 Start Qty: 1.00

Required Date: 03/08/2009 Req'd Qty: 1.00

Cust Item ID:




Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
160  Outsource1	Outsource process - Heat Treat	0.00							
	Memo	0.00							
	Issue P/O: <u>10539</u> <input type="checkbox"/> Heat Treat to min 180 KSI As per Dwg D350-748-241 <input type="checkbox"/> Sand Blast tube after Heat Treat <input type="checkbox"/> Possible Supplier: Vac Aero <input type="checkbox"/> Ensure Certificate of Conformity is attached								
170  Packaging	Receive & Inspect for Damage & Mat'l Certs	0.00							
	Memo	0.00							
	Ensure certificate of conformaty is attached								
180  QC	QC6- Inspect dimensions to drawing	0.00							
	Memo	0.00							
	Quality Control								

10910-710910/06037501/1/23

Work Order ID 48606

June 26, 2009 10:54:57 AM

Page 4

Item ID: D350-748-241TRN

Accept

Revision ID: D

Item Name: Crosstube Turning Detail

Start Date: 15/07/2009 Start Qty: 1.00

Required Date: 03/08/2009 Req'd Qty: 1.00

Cust Item ID:

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run Start

Stop

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Draw
Number

Draw
Rev.

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

190

0.00



Packaging

Packaging

Memo

0.00

Packaging

Identify and stock in kanban rack ☐ Location:

Kule cel

MB09-4-23

200

QC21- Final Inspection - Work Order Release

0.00



QC

Memo

0.00

Quality Control

09/11/24 DJ

MR 09-11-23

Picklist Print

June 26, 2009 10:54:57 AM

Page 1

Work Order ID: 48606

Parent Item: D350-748-241TRNRevD

Parent Item Name: Crosstube Turning Detail



Start Date: 15/07/2009

Required Date: 03/08/2009

Comments:

Start Qty: 1.00

Required Qty: 1.00

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Remaining Qty To Pick	Qty Issued	Date Issued	Status
✓ D6018-125RevA 		Manufactured	No			120	Each	0.0000	1.0000			
Crosstube Material												

see
old w/o. → next
page
MF 09-11-23

Date: Tuesday, 16/06/2009 8:49:00 AM
 User: Julie Dawson

Process Sheet

Customer : CU-DAR001 Dart Helicopters Services	Drawing Name : X-TUBE AS 350/355 HI AFT
Job Number : 48606	
Estimate Number : 13225	
P.O. Number :	Part Number : D350748241TRN
This Issue : 16/06/2009 S.O. No. :	Drawing Number : D350-748-241 REV.D
Prsht Rev. : NC	Project Number : N/A
First Issue : // Type : CROSSTUBES	Drawing Revision : D
Previous Run : 48605	Material :
Written By :	Due Date : 23/06/2009 Qty: 1 Um: Each
Checked & Approved By : <u>JUD 09.06.17</u>	
Comment : Est Rev:A New Issue 08-03-06 DD verified by:ec Est Rev B Removed polish 08.04.02 EC verified by : DD Est Rev C Removed LPS-3 08.06.23 Ec verified by: DD	

Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :
----------------	------------------------------	----------------------

1.0 ✓	D6018125	Crosstube Material
-------	----------	--------------------



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)
 Crosstube Material
 D6018-125
 2.299" OD X 2.000" ID
 Batch: 632913

Q.M 09.06.17 ①

2.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE
-----	------------	----------------------------

**Comment:** MORI SEIKI CNC LATHE LARGE

1-Fill tube with sand & install plugs on both ends as per Folio FA647

2-Turn first side as per Folio FA647

3- File transition lines smooth.

Q.M 09.06.17 ①

3.0	QC1	INSPECT ALL DIM TO DIM SHEET
-----	-----	------------------------------

**Comment:** INSPECT ALL DIM TO DIM SHEET

Q.M 09.06.17 ①

4.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE
-----	------------	----------------------------

**Comment:** MORI SEIKI CNC LATHE LARGE

1-Turn second side as per Folio FA647

2- File transition lines smooth.

Q.M 09.06.17 ①

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Tuesday, 16/06/2009 8:49:00 AM
User: Julie Dawson

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI AFT

Job Number: 48606

Part Number: D350748241TRN

Job Number:



Seq. #:

Machine Or Operation:

Description :

3-Scribe part # as per Dwg D350-748-241

A.M 09.06.17

5.0

QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

A.M 09.06.17

6.0

QC8

SECOND CHECK



Comment: SECOND CHECK

A.M 9-6-17

(1)

7.0

LARGE FAB 1

LARGE FABRICATION RESOURCE 1



Comment: LARGE FABRICATION RESOURCE 1

A.M 9-6-17

(1)

Grind machining marks.

8.0

OUTSIDE SERV.11

OUTSIDE SERVICE -CROSSTUBES



Comment: Sub-Contracting OUTSIDE SERVICES

Issue P/O: _____

Heat Treat to min 180 KSI As per Dwg D350-748-241

Sand Blast tube after Heat Treat

Possible Supplier: Vac Aero

Ensure Certificate of Conformity is attached

9.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Receive & Inspect For Transit Damage

Ensure certificate of conformaty is attached

10.0

QC6

DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

11.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and stock in kanban rack

Location: _____

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Tuesday, 16/06/2009 8:49:00 AM
User: Julie Dawson

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI AFT

Job Number: 48606

Part Number: D350748241TRN

Job Number:



Seq. #:

Machine Or Operation:

Description :

12.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

Job Completion



W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order: 48000
Description: Crosstube Assembly (AS350/355 High Aft)	Part Number: D350-748-241
Inspection Dwg: D350-748-241 Rev: D	Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article
 ☐ Prototype

Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.245	✓		
	2.180	+0.005/-0.000	2.185	✓		
	2.180	+0.005/-0.000	2.185	✓		
	2.208	+0.005/-0.000	2.213	✓		
	2.234	+0.005/-0.000	2.236	✓		
	2.253	+0.005/-0.000	2.253	✓		
	2.272	+0.005/-0.000	2.274	✓		
	2.299	+0.005/-0.000	2.304	✓		
	0.063	+/-0.010	0.063	✓		
	4.26	+/-0.030	4.260	✓		
	R0.063	+/-0.010	R0.063	✓		
	R0.50	+/-0.030	R0.500	✓		
SIDE B	2.240	+0.005/-0.000	2.245	✓		
	2.180	+0.005/-0.000	2.185	✓		
	2.180	+0.005/-0.000	2.185	✓		
	2.208	+0.005/-0.000	2.213	✓		
	2.234	+0.005/-0.000	2.236	✓		
	2.253	+0.005/-0.000	2.253	✓		
	2.272	+0.005/-0.000	2.274	✓		
	2.299	+0.005/-0.000	2.304	✓		
	0.063	+/-0.010	0.063	✓		
	4.26	+/-0.030	4.260	✓		
	R0.063	+/-0.010	R0.063	✓		
	R0.50	+/-0.030	R0.500	✓		
	122.70	+/-0.060	122.70	✓		

Measured by: C.M.	Audited by: AJM	Prototype Approval:	N/A
Date: 09.06.17	Date: 9-6-17	Date:	N/A

Rev	Date	Change	Revised by	Approved
A	07.01.17	New Issue (P/O D350-748-201)	KJ/JLM	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART

DESIGN <i>qp</i>	DRAWN BY <i>qp</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>///</i>	APPROVED <i>///</i>	DRAWING NO. D350-748-241	REV. D SHEET 1 OF 3
DATE 06.10.31		TITLE CROSSTUBE (AS 350/355 HI AFT)	
A	06.03.31	NEW ISSUE	
B	06.06.30	ADD D6018-125 & PRIME AND PAINT	
C	06.08.14	ADD CAD PLATING	
D	06.10.31	MAG. PARTICLE AND CAD PLATE AS MFD.	

RELEASED06.10.31 *///*

QTY	P/N	DESCRIPTION
X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
1	D6018-125	CROSSTUBE (OR D6015-125)
2	D3502-1	SUPPORT
2	D2856-400-710	ABRASION STRIP
1	AELS-1032-225	INSERT
1	AN960JD10	WASHER
2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
1	MS27039-1-10	SCREW

D350-748-141 CROSSTUBE:

- MATERIAL: MANUFACTURED FROM D6018-125 OR D6015-125
FINISHED LENGTH = 122.70±0.06
- MACHINE PER MACHINING DETAIL ON PAGE 3. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITIONS SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS
- BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING
- FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- INSTALL D2856-400-710 ABRASION STRIP WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- TORQUE MS21920-20 CLAMPS 60 TO 80 IN-LB
- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- ALL DIMENSIONS ARE IN INCHES
- PART IS SYMMETRIC ABOUT CENTERLINE EXCEPT FOR Ø0.297 HOLE.

UNDER REVIEW

09.02.05

PER DART 09-001

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NO. 48604

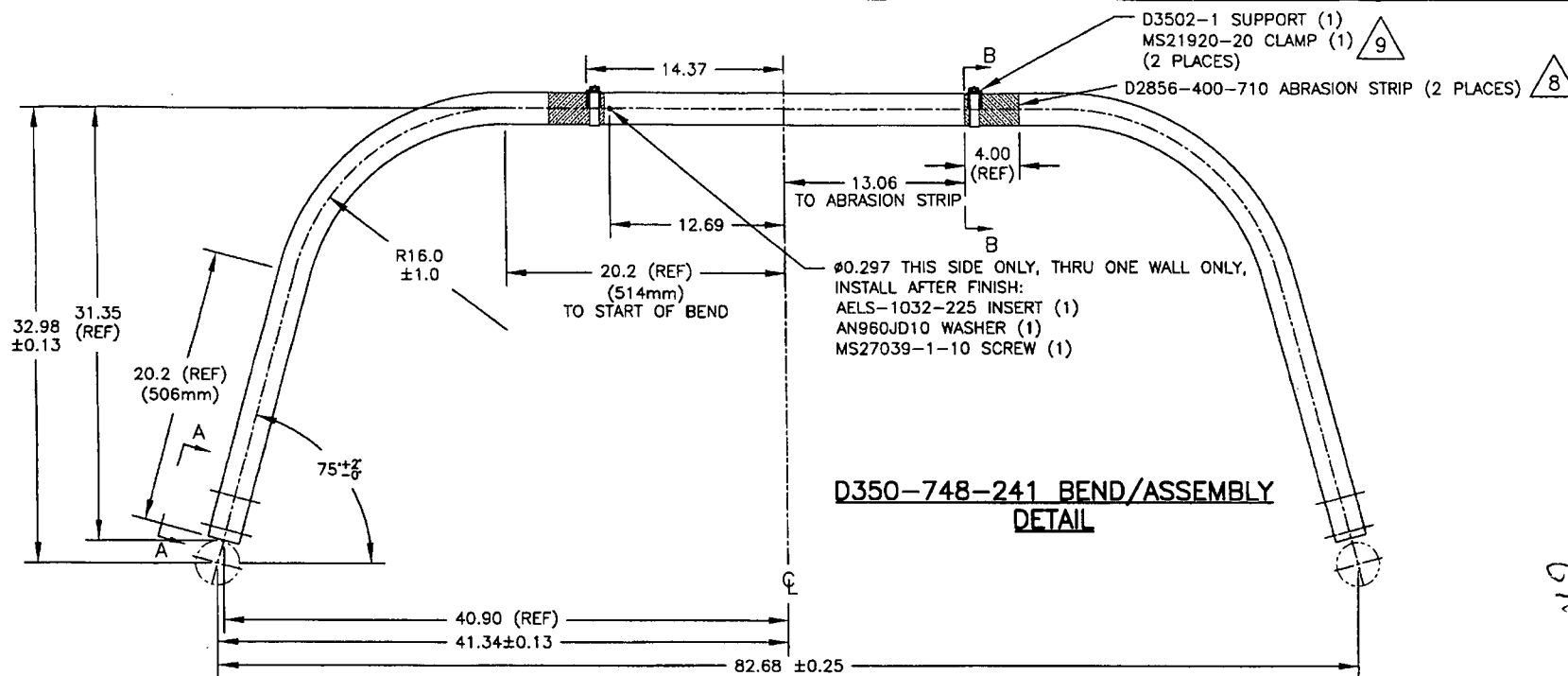
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07.02.16

CUT OFF 07.02.16

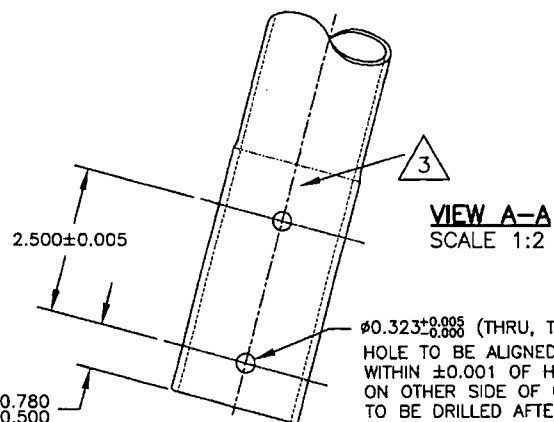
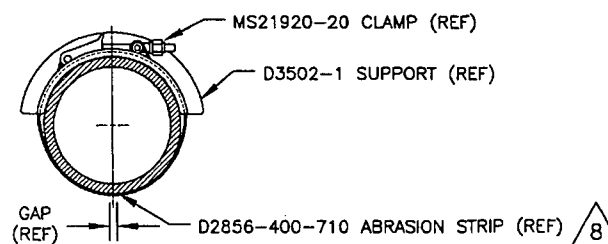
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D350-748-241 BEND/ASSEMBLY DETAIL

SECTION B-B SCALE 1:2



VIEW A-A SCALE 1:2

Handwritten signature

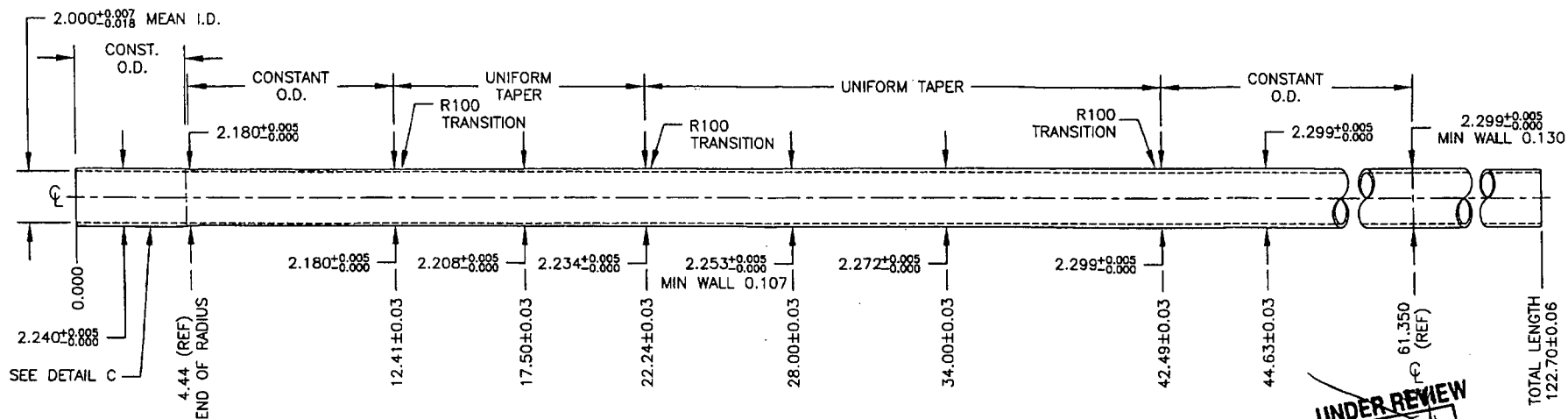
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09.02.05

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07.02.06
OK 12.10.22

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06.10.31

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CHECKED	#	APPROVED	#	DRAWING NO.	D350-748-241	REV. D	SHEET 2 OF 3
DATE	06.10.31	TITLE	CROSSTUBE (AS 350/355 HI AFT)				
		SCALE	1:8				



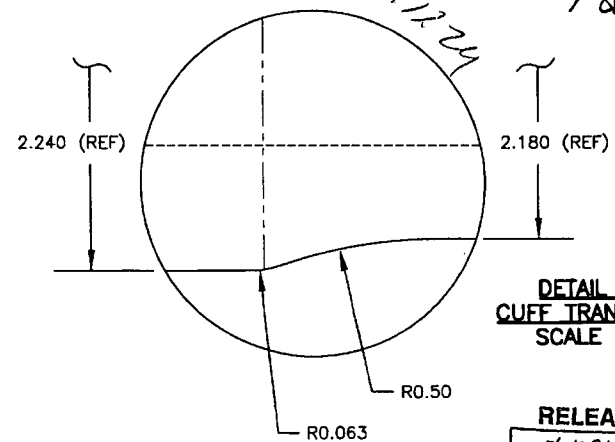
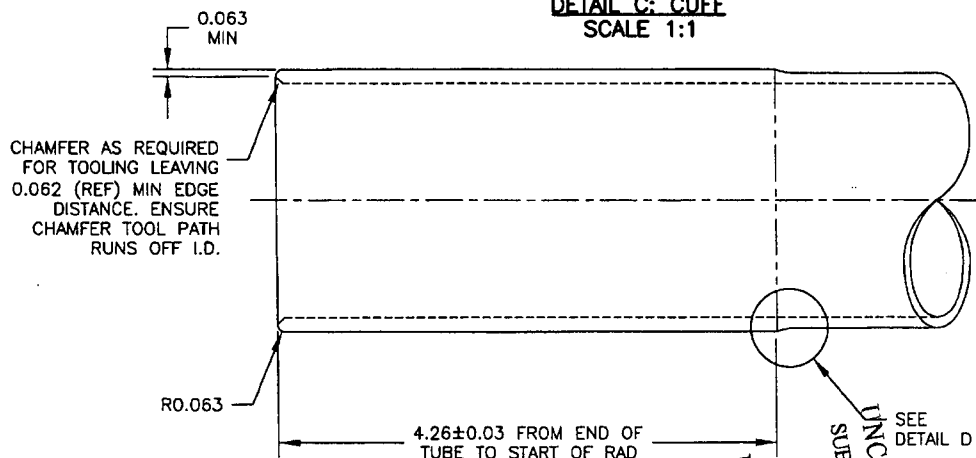
D350-748-241 MACHINING DETAIL

UNDER REVIEW
09.02.05.1

UNDER REVIEW
09.02.06.1

OK 09.12.22

DETAIL C: CUFF SCALE 1:1



DETAIL D: CUFF TRANSITION SCALE 9:1

RELEASED
06.10.31

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		DATE	06.10.31			D350-748-241	REV. D
						TITLE	SHEET 3 OF 3
						CROSSTUBE (AS 350/355 HI AFT)	SCALE 1:4

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VAC AERO
INTERNATIONAL INC.

RELEASE NO

GST No.: R105468102

OAK 113616



HEAD OFFICE
1371 SPEERS ROAD, OAKVILLE, ONTARIO
CANADA L6L 2X5
TEL: (905) 827-4171 FAX: (905) 827-7489



2009 WYECROFT ROAD, UNIT B
OAKVILLE, ONTARIO
CANADA L6L 6J4
TEL: (905) 827-7377 FAX: (905) 827-1380



QUEBEC DIVISION
7450 RUE VÉRITÉ STREET, ST. LAURENT, QUÉBEC
CANADA H4S 1C5
TEL: (514) 334-4240 FAX: (514) 334-6269

11/03/20

MM / DD / YY

PAGE: 1

1DAR01
BILL TO: DART AEROSPACE LTD.
1270 ABERDEEN ST.
HAWKESBURY, ON

SHIP TO: DART AEROSPACE LTD.
1270 ABERDEEN ST.
HAWKESBURY, ON

K6A 1K7

K6A 1K7

DATE SHIPPED	SHIP VIA	F.O.B.
11/03/2009		ORIGIN
CUSTOMER P/O No.	JOB No.	TERMS
10539		NET 30 DAYS

PART No.	DESCRIPTION	UOM	QTY ORD	QTY SHPD	TEST RESULTS
D350-748	-141/241	EA	12	12	
<p>Process Specifications: Procedure: 4353 HEAT TREATED TO 180 KSI MIN. PER DRAWING 100% HARDNESS CHECKED AS PER ASTM E-18 40/45 HRC MATERIAL: 4130</p> <p>4 PIECES B48603, B48604, B48605, B48606, P/N D350-748-241 8 PIECES B50622, B50627, B50628, B50629, P/N D350-748-141 B50621, B50622, B50623, B50625</p>					
<p>100% HARDNESS TEST 1.5 pu. 42/43 HRC</p> <p>VA.I.O. TH. 25 Q.C.</p> <p>GP 09.11.23</p>					

I hereby certify that the material covered by this release note has been inspected and tested and conforms to all specifications relevant thereto in accordance with the conditions of the contract / or purchase order.

ON BEHALF OF VAC AERO INTERNATIONAL INC.



METAL TREATING INSTITUTE

Authorized Q.C. Inspector

VACUUM BRAZING - HEAT TREATING - SPECIAL PROCESSING - FURNACE EQUIPMENT
TURBINE COMPONENT OVERHAUL - PLASMA AND OTHER COATINGS

